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Access to business subsidies: What explains complementarities and persistency?

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Keskusteluaiheita – Discussion papers

1226

Heli Koski – Mika Pajarinen

**ACCESS TO BUSINESS SUBSIDIES:
WHAT EXPLAINS COMPLEMENTARITIES
AND PERSISTENCY?**

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ABSTRACT: Our empirical analysis using an extensive database on the allocation of business subsidies in Finland during the years 2004–2008 finds that large firms are less likely to exit support system and more likely to continue receiving both support from one organization only and simultaneous support from multiple organizations. Large firms' propensity to transit between subsidies of different organizations is also higher than that of the smaller ones. Our study detects another interesting characteristic of the Finnish business subsidy system: the existence of agency-specific loyal customers. Firm size relates positively to the probability of a firm becoming the agency-specific customer of any public support provider, while the effect of other firm-level factors on this probability varies among the agencies. In addition to this, various parts of our analysis suggest that there is also a group of firms – comprising more likely larger firms – that tends to obtain support simultaneously from at least from two different organizations over several years. This finding is, as is the existence of agency-specific loyal customers, contrary to the basic principles of business subsidy system originally designed for providing temporary aid for companies.

KEYWORDS: public subsidies, complementarities, transitions, persistency.

JEL: L53, O25.

KOSKI, Heli – PAJARINEN, Mika, ACCESS TO BUSINESS SUBSIDIES: WHAT EXPLAINS COMPLEMENTARITIES AND PERSISTENCY? Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2010, 16 p. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 1226).

TIIVISTELMÄ: Tässä tutkimuksessa käytetyn laajan yritystukien jakamista Suomessa vuosina 2004–2008 koskevan aineiston analyysi osoittaa, että suurilla, kerran tukea saaneilla yrityksillä on taipumusta pysyä yritystukien piirissä. Suuret yritykset jatkavat muita todennäköisemmin sekä vain yhden organisaation tuen että useamman organisaation samanaikaisen tuen piirissä. Suuret yritykset siirtyvät myös jonkin organisaation tuen piiristä toisen organisaation tukien käyttäjiksi pieniä yrityksiä todennäköisemmin. Aineistoanalyysin perusteella havaitaan myös toinen mielenkiintoinen suomalaisen yritystukijärjestelmän piirre: havaittu tukien saamisen jatkuvuus liittyy osittain organisaatiokohtaisiin kanta-asiakkaisiin. Yrityksen koko liittyy positiivisesti yrityksen todennäköisyyteen olla minkä tahansa rahoittajaorganisaation kanta-asiakas, kun taas kanta-asiakkaiden muiden yrityskohtaisten ominaisuuksien osalta löytyy organisaatiokohtaisia eroavaisuuksia. Tämän lisäksi joukko yrityksiä – johon suuret yritykset kuuluvat muita todennäköisemmin – saa tukia samanaikaisesti usealta eri organisaatiolta useiden vuosien ajan. Tämä, kuten myös organisaatiokohtaisten kanta-asiakkaiden olemassaolo, on vastoin yritystukijärjestelmän peruseräatetta tarjota väliaikaista tukea sitä tarvitseville yrityksille.

AVAINSANAT: Yritystuet, täydentävyys, transiitot, pysyvyys.

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1. INTRODUCTION

Why certain firms tend to receive multiple forms of public support and/or continue seeking and receiving business subsidies during numerous consecutive years? This paper aims at detecting the dynamics of firms' transitions between different states of subsidy reception and non-subsidization, particularly after the firm has once entered the subsidy system, using data from the primary public support programs in Finland during the years 2004–2008.

In 2008, over 30,000 Finnish firms (i.e. almost 10 percent of total population of firms in Finland) received, in total, about 1.77 billion euro of public support from the major government programs granting money for entrepreneurial activities. In the small-country context this sum is non-negligible: it was 4 percent of the total budget of Finnish government and almost one percent of Finland's GDP. Our definition of public support here includes all forms of public support and funding from direct investment, employment, R&D and start-up grants¹ to loans and guarantees and service subsidies. Business subsidies in Finland – excluding service subsidies of which order of magnitude our data do not reveal – were allocated as follows: the share of grants was 31 percent, loans 32 percent and guarantees about 37 percent.

This study relates to the stream of empirical literature that aims at explaining the dynamics of the allocation of business subsidies (see, e.g., Feldman and Kelley, 2001; Blanes and Busom, 2004; Tanayama, 2007; Aschhoff, 2009; Koski and Tuuli, 2010). Various previous studies find a notable persistency in the allocation of business subsidies; a firm's prior subsidy reception history seems to positively affect its probability to obtain further public support. Unlike most empirical studies focusing merely on R&D subsidies, Koski and Tuuli (2010) use an extensive database of the allocation of different types of business subsidies among 330,000 firms in Finland from the year 2004 and 2008². Their empirical exploration explicitly distinguishes the subsidy application decisions of the firms and the application acceptance decisions of the funding agencies, and finds that persistency in the firms' participation in the

¹ Statistical data on start-up grants is available only for the years 2007 and 2008. It is in a format that allows it to be combined with the firm-level data only for the year 2008.

² We use the same database as Koski and Tuuli (2010).

government support programs arises both from the application and acceptance stages. A firm that has once received subsidy from an agency, tends to apply it again, and it also seems that the agencies target their support to the firms they have previously subsidized.

This study contributes to the existing literature by not only investigating the allocation of business subsidies within a single subsidy program as done in previously reported studies. Instead, we provide a more comprehensive analysis concerning the dynamics of business subsidy allocation of all major organizations of one country, Finland. Second, our empirical analysis complements the previous empirical studies on the selection of firms to the public support programs by not only exploring the transitions of the firms between the states of non-subsidization and subsidization but also between the different states of subsidy reception *after* they have received any type of business subsidy.

Our data from 63,351 subsidized and 365,212 unsubsidized firms during the years 2004-2008 suggests that firms' persistency in the subsidy reception is particularly strong among the large companies, and that persistency often involves simultaneous reception of business subsidies from at least two organizations over several years. On the other hand, it seems that certain subsidy allocation agencies have a relatively permanent set of customers, which we call *agency-specific loyal customers*, receiving subsidy only from that agency over multiple years.

This paper is organized as follows. Section 2 provides introduction to the database used in the empirical analysis. It also reports our descriptive findings concerning the transition probabilities between the different states of subsidization, separating the samples of large firms and SMEs. Section 3 discusses our econometric approach and reports the results of the estimated models. Section 4 sheds further light on persistency by extending our empirical one-year-after transition analysis to the descriptive measures of firms' subsidy reception three years later. Section 5 concludes.

2. DESCRIPTIVE FINDINGS

2.1. DATA

This study uses a database comprising the allocation of public support for firms during the period of 2004–2008³ by the following five major agencies allocating business subsidies in Finland: Finnvera, TEKES (the Finnish Funding Agency for Technology and Innovation), the Ministry of Employment and the Economy (MEE)⁴, and the Ministry of Agriculture and Forestry (MAF)⁵, and Finpro. Finnvera is the biggest provider of public support covering in 2008 about 64 percent of the total support allocated for companies. It offers loans, venture capital investments, and it is the only public provider of guarantees in Finland. Tekes allocating R&D grants and loans and the Ministry of Employment and the Economy distributing various different types of grants allocated each about 17 percent of public funds targeted for firms. The share of the Ministry of Agriculture and Forestry of public funding was relatively small, less than 4 percent of the total funds. The relative shares of these public support providers have not changed much during the sample years (Koski and Pajarinen, 2010).

Finpro is one of the largest organizations (in terms of the number of employees) providing business services in Finland (Hyytinen et al, 2009). It provides service subsidies particularly targeted to the commercialization and internationalization of innovative activities and new products. Our data concerning Finpro's service subsidies capture only whether a firm has been Finpro's client during the years 2004–2008 but not the order of magnitude of service subsidies obtained by the firms.

³ The database of business subsidies in Finland covers the years 2000–2008 for some of the sample agencies but not all and thus we have limited our empirical research to the years 2004–2008.

⁴ The Ministry of Employment and the Economy was established in the beginning of the year 2008 as a merger of the two ministries, Ministry of Trade and Industry and Ministry of Labor. Prior to 2008, our data comprise the total public support of the two merged ministries.

⁵ Our data do not comprise public support that the Ministry of Agriculture and Forestry allocated during the year 2000.

We merge data on business subsidies database with the business register of firms operating in Finland and databases about firms' financial information and R&D activities, all provided by Statistics Finland. In total, the data consist of 428,563 firms and 1,442,884 observations.

2.2. TRANSITION PROBABILITIES

Our empirical analysis focuses on the transitions of the firms in the Finnish subsidy system between the different states of subsidy reception and non-reception among the five major allocators of business subsidies. A probability transition matrix between the different states can be presented as in Table 1.

Table 1. Probability transition matrix

P_{NN}	P_{NT}	P_{NF}	P_{NE}	P_{NP}	P_{NA}	P_{N2+}
P_{TN}	P_{TT}	P_{TF}	P_{TE}	P_{TP}	P_{TA}	P_{T2+}
P_{FN}	P_{FT}	P_{FF}	P_{FE}	P_{FP}	P_{FA}	P_{F2+}
P_{EN}	P_{ET}	P_{EF}	P_{EE}	P_{EP}	P_{EA}	P_{E2+}
P_{PN}	P_{PT}	P_{PF}	P_{PE}	P_{PP}	P_{PA}	P_{P2+}
P_{AN}	P_{AT}	P_{AF}	P_{AE}	P_{AP}	P_{AA}	P_{A2+}
P_{2+N}	P_{2+T}	P_{2+F}	P_{2+E}	P_{2+P}	P_{2+A}	P_{2+2+}

In Table 1 N denotes the state of non-reception of subsidies, T = only R&D subsidy from Tekes, F = only loans/guarantees from Finnvera, E = only direct subsidy from the Ministry of Employment and the Economy, P = only service subsidy from Finpro, A = only direct subsidy from the Ministry of Agriculture and Forestry, and 2+ = simultaneous subsidy from at least two agencies. The transition matrix describes the probabilities (P) of a firm moving among the states of subsidization and non-subsidization. For instance, P_{NT} denotes the probability of a firm's transition from the state of non-subsidization at time t-1 to reception of only R&D subsidy from Tekes at time t, and P_{P2+} is the probability of a firm receiving only service subsidy at time t-1 from Finpro to receive subsidies from at least two different agencies at time t, given that the firm has received government subsidy at least once before.

The annual level calculations concerning transitions between the states of subsidy reception and no subsidies granted during the years 2004–2008 indicate certain persistency as we can see from Table 2. A firm receiving no subsidy at time t-1 has as high as 97 percent probability

to remain in the state of non-subsidy at time t . This probability is lower for the large firms (i.e. 80 percent). Also the firms that receive subsidy only from one of the agencies at time $t-1$ have a relatively high probability to not to obtain any subsidies during the following year, with the exception of Finpro of which customers have only 18 percent probability to “exit” subsidy system at time t .

Table 2. Transition probabilities for the whole sample, large firms (), and small firms []

P_{NN} 0.965 (0.797) [0.965]	P_{NT} 0.001 (0.026) [0.001]	P_{NF} 0.006 (0.001) [0.006]	P_{NE} 0.023 (0.121) [0.023]	P_{NP} 0.001 (0.035) [0.001]	P_{NA} 0.001 (0.001) [0.001]	P_{N2+} 0.002 (0.020) [0.002]
P_{TN} 0.554 (0.679) [0.546]	P_{TT} 0.149 (0.143) [0.149]	P_{TF} 0.044 (0.000) [0.044]	P_{TE} 0.091 (0.107) [0.092]	P_{TP} 0.031 (0.000) [0.033]	P_{TA} 0.001 (0.000) [0.001]	P_{T2+} 0.129 (0.071) [0.134]
P_{FN} 0.549 (0.000) [0.548]	P_{FT} 0.008 (0.000) [0.007]	P_{FF} 0.281 (0.000) [0.282]	P_{FE} 0.070 (0.000) [0.069]	P_{FP} 0.006 (0.000) [0.006]	P_{FA} 0.005 (0.000) [0.004]	P_{F2+} 0.082 (0.000) [0.083]
P_{EN} 0.416 (0.163) [0.424]	P_{ET} 0.003 (0.008) [0.003]	P_{EF} 0.013 (0.008) [0.013]	P_{EE} 0.523 (0.731) [0.516]	P_{EP} 0.003 (0.008) [0.003]	P_{EA} 0.001 (0.000) [0.001]	P_{E2+} 0.041 (0.083) [0.041]
P_{PN} 0.184 (0.067) [0.209]	P_{PT} 0.009 (0.010) [0.009]	P_{PF} 0.006 (0.000) [0.006]	P_{PE} 0.022 (0.013) [0.023]	P_{PP} 0.589 (0.595) [0.583]	P_{PA} 0.000 (0.000) [0.000]	P_{P2+} 0.190 (0.314) [0.170]
P_{AN} 0.786 (0.000) [0.769]	P_{AT} 0.000 (0.000) [0.000]	P_{AF} 0.038 (0.000) [0.047]	P_{AE} 0.092 (0.000) [0.100]	P_{AP} 0.003 (0.000) [0.003]	P_{AA} 0.060 (0.000) [0.057]	P_{A2+} 0.022 (0.000) [0.023]
P_{2+N} 0.161 (0.035) [0.176]	P_{2+T} 0.018 (0.002) [0.020]	P_{2+F} 0.067 (0.003) [0.076]	P_{2+E} 0.184 (0.071) [0.199]	P_{2+P} 0.121 (0.217) [0.109]	P_{2+A} 0.001 (0.000) [0.001]	P_{2+2+} 0.447 (0.672) [0.420]

Notes: Based on the guidelines of the European Commission, small firms are defined as those who had at time $t-1$ less than 250 employees and turnover not more than 50 million euro or total assets not more than 43 million euro.

The persistency of subsidy reception over time among those that receive multiple simultaneous subsidies, and particularly among the large firms obtaining support from various agencies, seems very strong. Only 16 percent of firms obtaining subsidies from at least two different agencies transit to the state of no subsidy and 45 percent of them continue to obtain multiple forms of support during the following year. Interestingly, only 4 percent of large firms obtaining business subsidies from at least two different organizations at time t-1 exit the support system and 67 percent of them are still having multiple subsidies at time t.

Transitions from the state of receiving *only* support from a certain agency to receiving it also subsequently only from the same agency capture, to some extent, the order of magnitude of persistency of *agency-specific loyal customers*. A firm's probability of being only Finpro's client or only the client of the Ministry of Employment and the Economy both at time t-1 and t are relatively high, 59 and 52 percent, respectively. This probability is particularly high (i.e. 73 percent) for the large customers of the Ministry of Employment and the Economy. Lower transition probabilities from only Tekes/Finnvera subsidy at time t-1 to only Tekes/Finnvera subsidy at time t hint that Tekes and Finnvera have less agency-specific loyal customers. However, this does not give any indication of the order of magnitude of loyal customers of Tekes and Finnvera that use also the subsidies of the other public funding organizations. It merely tells that a firm's probability to remain using only the subsidies of one agency is relatively low for the clients of Tekes and Finnvera.

3. EMPIRICAL EXPLORATION

3.1. ECONOMETRIC MODEL AND VARIABLES

Our econometric model aims at detecting whether and how a firm's prior business subsidies and certain firm-specific characteristics relate to its probability to transit between the different states of subsidy reception. We estimate the multinomial logit models using pooled firm-level data from the years 2004–2008 for the firms' transitions among seven different states (i.e. state of non-subsidization, state of receiving subsidy only from one of the agencies (five alternatives), and state of receiving subsidies simultaneously from at least two agencies) as follows:

$$P(Y_{it} = j | Y_{it-1} = k) = \frac{\exp(\beta'_j X_i)}{\sum_k \exp(\beta'_k X_i)} \quad j,k=1,2,3,4,5,6,7 \quad (1)$$

where subscript i refers to firm i and X denotes the characteristics of firm i transiting from state k to j .

The explanatory variables of interest in the estimated model capture the subsidy allocations of different agencies prior to the transitions (measured by the dependent variables), at time $t-2$. The dummy variables L2.Finnvera, L2.Tekes, L2.MEE, L2.MAF and L2.Finpro take value 1 if a firm has received subsidy from the organization in question at time $t-2$, and 0 otherwise. We also control for – following the guidelines of previous empirical studies concerning the determinants of business subsidy allocation (see, e.g., Koski and Tuuli, 2010) – firm’s age (variable AGE), size (variable SIZE), its R&D intensity measured by the firm’s R&D spending relative to its turnover (variable R&D), and foreign ownership (dummy variable FOREIGN). These variables are measured at time $t-1$. Industry, regional and year dummies further control for the industry, region and time specific variation in the allocation of business subsidies.

Table 3 reports descriptive statistics for the explanatory variables. We can see that two public support organizations have significantly larger number of supported firms at time $t-2$ than the other three organizations: 3 percent of observations have received support from the Ministry of Employment and the Economy, and 2 percent from Finnvera at time $t-2$, respectively. Services from Finpro, or public support from Tekes, or the Ministry of Agriculture and Forestry has received 0.2 percent of observations at time $t-2$. On average, firms in the estimation sample are very small, the mean of the log of SIZE is only -0,052. They are also relatively young, as the mean of the log of age is 2.3. The low mean of the variable R&D indicates that on average firms do only small-scale R&D efforts. 1 percent of firms in the estimation sample are foreign-owned at time $t-1$.

Table 3. Explanatory variables and their descriptive statistics

Name	Description	Mean	S.D.
L2.FINNVERA	Dummy variable that takes value 1 if a firm has received loans and/or guarantees from Finnvera at time t-2, and 0 otherwise.	0.018	0.013
L2.TEKES	Dummy variable that takes value 1 if a firm has received R&D support from Tekes at time t-2, and 0 otherwise.	0.002	0.047
L2.MEE	Dummy variable that takes value 1 if a firm has received direct support from Ministry of Employment and the Economy at time t-2, and 0 otherwise.	0.027	0.162
L2. MAF	Dummy variable that takes value 1 if a firm has received direct support from Ministry of Agriculture and Forestry at time t-2, 0 otherwise.	0.003	0.051
L2. Finpro	Dummy variable that takes value 1 if a firm has received service support from Finpro at time t-2, and 0 otherwise.	0.002	0.046
SIZE	Log firm's number of employees (full time equivalent) at time t-1.	-0.052	1.958
AGE	Log firm's age at time t-1.	2.300	0.836
R&D	Log firm's R&D spending relative to its turnover at time t-1.	-16.211	1.632
FOREIGN	Dummy variable that gets value 1 if firm has a foreign owner at time t-1, and 0 otherwise.	0.009	0.095
	+ 15 industry dummies		
	+ 4 regional dummies		
	+ 3 year dummies		

3.2. ESTIMATION RESULTS

Table 4 summarizes the estimation results. Certain transitions were so exceptional that it was not possible to estimate coefficients for the set of variables explaining their occurrence. These cases are marked as 'Too few observations for estimations'.⁶ It is interesting as such to observe that the transitions from receiving support only from one organization to having support only from the same organization again or to having multiple different types of support

⁶ These cases incorporated into the separate category 'others' which was included in the estimated model as one of the transition possibilities. The estimation results of this category are not reported in Table 4, as there is no meaningful interpretation for the results concerning this category that combines a mixture of different (rare) transitions.

during the next year are common but generally firms don't transit from the one agency's support only to the state of another agency's support only.

Our estimation results suggest that a firm's prior support from a certain agency at time $t-2$ generally increases the firm's likelihood to transit from the state of non-support to having subsidy only from the agency and also the firm's propensity to remain as a client of only that agency from time $t-1$ to t . The only exception is the Ministry of Employment and the Economy of which prior (i.e. at time $t-2$) support relates negatively to the continuation of MEE support from time $t-1$ to t , but it does relate positively and statistically significantly a firm's transit from state of non-subsidization to having only MEE subsidy. Also, subsidies from Tekes at time $t-2$ are negatively and statistically significantly related to the continuation of only MEE support from time $t-1$ to t . In other words, the continuing clients receiving subsidy only from MEE tend to be different from the firms previously subsidized by Tekes.

It is also interesting that prior support at time $t-2$ from any of the agencies explains positively and statistically a firm's transit from the state of non-subsidization to the state of receiving support simultaneously from at least two agencies. Also, the firm's prior support from any agency, except the Ministry of Agriculture and Forestry, is positively related to its likelihood to continue receiving multiple subsidies from time $t-1$ to t . The transitions from the state of multiple subsidies to receiving subsidy only from a single organization also relates generally positively to a firm's prior, at time $t-2$ allocated, support from the same organization.

Table 4. Estimation results

P _{NN}	P _{NT}	P _{NF}	P _{NE}	P _{NP}	P _{NA}	P _{N2+}	
Base outcome	Tekes 1.845 *** Finnvera 0.751 *** MEE 0.673 *** Finpro 0.846 *** MAF 1.214 ** AGE -0.233 *** SIZE 0.679 *** R&D 0.085 *** FOREIGN -1.136 ***	Tekes 1.242 *** Finnvera 2.394 *** MEE 0.472 *** Finpro 0.595 *** MAF 0.392 * AGE -0.287 *** SIZE 0.296 *** R&D -0.059 *** FOREIGN -2.717 ***	Tekes 0.311 ** Finnvera 0.365 *** MEE 1.492 *** Finpro 0.002 MAF 0.843 *** AGE -0.207 *** SIZE 0.476 *** R&D -0.040 *** FOREIGN -1.008 ***	Tekes 1.248 *** Finnvera 0.271 MEE 0.315 ** Finpro 2.767 *** MAF -14.62 *** AGE 0.105 * SIZE 0.704 *** R&D 0.017 FOREIGN -0.005	Tekes 0.910 Finnvera -0.143 MEE 0.625 *** Finpro -0.025 MAF 2.871 *** AGE -0.266 *** SIZE 0.056 ** R&D -0.046 FOREIGN -15.10 ***	Tekes 1.617 *** Finnvera 1.992 *** MEE 1.250 *** Finpro 1.165 *** MAF 1.510 *** AGE -0.284 *** SIZE 0.651 *** R&D 0.042 *** FOREIGN -1.260 ***	INDUSTRY Yes AREA Yes YEAR Yes Obs. 539841 Wald (Model) 193938.5 Log likelih. -96454.7
P _{TN}	P _{TT}	P _{TF}	P _{TE}	P _{TP}	P _{TA}	P _{T2+}	
Base outcome	Tekes 0.980 *** Finnvera -0.312 MEE -0.158 Finpro 0.751 ** AGE -0.398 *** SIZE 0.233 ** R&D 0.018 FOREIGN -0.431	Too few observations for estimations	Tekes 0.352 Finnvera 0.549 MEE 0.503 Finpro -0.160 AGE 0.129 SIZE -0.069 R&D 0.014 FOREIGN -1.004	Too few observations for estimations	Too few observations for estimations	Tekes 0.476 Finnvera 0.763 ** MEE 0.189 Finpro 1.177 *** AGE -0.238 * SIZE 0.241 *** R&D 0.024 FOREIGN -15.89 ***	INDUSTRY Yes AREA Yes YEAR Yes Obs. 682 Wald (Model) 8719.215 Log likelih. -767.311
P _{FN}	P _{FT}	P _{FF}	P _{FE}	P _{FP}	P _{FA}	P _{F2+}	
Base outcome	Too few observations for estimations	Tekes 0.400 Finnvera 1.105 *** MEE -0.142 Finpro 0.202 MAF 0.179 AGE 0.198 *** SIZE 0.236 *** R&D -0.007 FOREIGN -2.240 **	Tekes 0.500 Finnvera -0.061 MEE 0.579 *** Finpro 0.034 MAF 0.574 AGE -0.101 *** SIZE 0.213 *** R&D 0.008 FOREIGN -0.662	Too few observations for estimations	Too few observations for estimations	Tekes 1.114 *** Finnvera 0.747 *** MEE 0.614 *** Finpro 0.704 ** MAF 0.500 AGE 0.093 SIZE 0.528 *** R&D 0.035 ** FOREIGN -0.941	INDUSTRY Yes AREA Yes YEAR Yes Obs. 3832 Wald (Model) 11352.03 Log likelih. -3928.84
P _{EN}	P _{ET}	P _{EF}	P _{EE}	P _{EP}	P _{EA}	P _{E2+}	
Base outcome	Too few observations for estimations	Tekes 0.587 Finnvera 1.830 *** MEE -0.438 *** Finpro -0.400 MAF -0.680 AGE -0.123 ** SIZE 0.324 *** R&D 0.024 FOREIGN -15.98 ***	Tekes -0.317 ** Finnvera -0.005 MEE -0.165 *** Finpro -0.293 * MAF 0.011 AGE -0.010 SIZE 0.260 *** R&D -0.004 FOREIGN -0.378 **	Too few observations for estimations	Too few observations for estimations	Tekes 0.603 *** Finnvera 1.255 *** MEE -0.125 Finpro 0.970 *** MAF 0.492 * AGE -0.111 *** SIZE 0.486 *** R&D 0.023 * FOREIGN -0.822 **	INDUSTRY Yes AREA Yes YEAR Yes Obs. 18532 Wald (Model) 40113.55 Log likelih. -16176.12
P _{PN}	P _{PT}	P _{PF}	P _{PE}	P _{PP}	P _{PA}	P _{P2+}	
Base outcome	Too few observations for estimations	Too few observations for estimations	Too few observations for estimations	Tekes -0.073 Finnvera -0.386 MEE 0.334 * Finpro 1.220 *** AGE 0.024 SIZE 0.162 *** R&D 0.023 ** FOREIGN 0.380 **	Too few observations for estimations	Tekes 0.769 *** Finnvera 0.828 *** MEE 0.960 *** Finpro 0.554 *** AGE -0.009 SIZE 0.433 *** R&D 0.036 *** FOREIGN -0.129	INDUSTRY Yes AREA Yes YEAR Yes Obs. 2985 Wald (Model) 632.243 Log likelih. -2811.322
P _{AN}	P _{AT}	P _{AF}	P _{AE}	P _{AP}	P _{AA}	P _{A2+}	
Base outcome	Too few observations for estimations	Too few observations for estimations	Too few observations for estimations	Too few observations for estimations	Too few observations for estimations	Too few observations for estimations	
P _{2+N}	P _{2+T}	P _{2+F}	P _{2+E}	P _{2+P}	P _{2+A}	P ₂₊₂₊	
Base outcome	Tekes 1.356 *** Finnvera -0.450 MEE -0.032 Finpro -0.245 MAF 1.431 * AGE -0.180 *** SIZE 0.291 *** R&D 0.031 * FOREIGN -1.057	Tekes 0.299 Finnvera 1.466 *** MEE -0.053 Finpro -0.272 MAF 0.057 AGE 0.049 SIZE 0.201 *** R&D -0.013 FOREIGN -1.275 *	Tekes -0.177 Finnvera 0.121 MEE 0.658 *** Finpro -0.445 *** MAF 0.714 ** AGE -0.004 SIZE 0.276 *** R&D -0.016 * FOREIGN -0.810 *	Tekes 0.170 Finnvera -0.009 MEE -0.301 ** Finpro 2.708 *** MAF 0.535 AGE 0.059 SIZE 0.381 *** R&D 0.001 FOREIGN 0.041	Too few observations for estimations	Tekes 0.534 *** Finnvera 0.898 *** MEE 0.340 *** Finpro 1.567 *** MAF 0.099 AGE -0.028 SIZE 0.519 *** R&D 0.008 FOREIGN -0.405	INDUSTRY Yes AREA Yes YEAR Yes Obs. 5140 Wald (Model) 6636.400 Log likelih. -5965.725

Notes: Regression results are reported by rows, the base outcome is the leftmost outcome. All regressions include in addition to the reported explanatory variables 15 industry dummies, 4 regional dummies, and 3 year dummies. Statistical significances of coefficients have been calculated by using clustered sandwich standard errors. Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Firm size explains positively and statistically significantly most transitions to the different states of support reception – when exit from the support system is used as a reference point – and also the continuation of multiple support reception. In other words, large firms are more likely to enter the public support system and less likely to exit it once they have received

some type of subsidy but they rather tend to either transit between different subsidy programs or continue having support only from one agency or simultaneously multiple types of subsidies.

Firm size clearly relates positively to the probability of a firm becoming the agency-specific customer of any public support provider (i.e. a firm that tends to remain as the recipient of support from one organization only), while the effect of other firm-level factors on this probability vary among the agencies. The agency-specific, R&D subsidized customers of Tekes tend to be younger, while the agency-specific customers of Finnvera receiving repeatedly loans and/or guarantees tend to be older than the sample firms on average. Finnvera's specific customers are also relatively less R&D intensive and, similar to the agency-specific customers of the Ministry of Employment and the Economy, more often domestically owned. The agency-specific customers of Finpro obtaining service subsidies, instead, tend to be foreign-owned and more R&D intensive than firms on average.

Persistency in the reception of multiple subsidies seems to relate not only to the firm size and prior support reception but we also find that a firm's location and industry matter.⁷ While using the firms located in the Southern Finland as a reference group, we find that those firms located to Eastern and Northern Finland are more often the receivers of persistent multiple forms of business subsidies. Also, firms in certain industrial sectors (i.e. pulp and paper, chemicals, machinery and equipment, and electronics and electrical engineering) seem to continue receiving at least two different subsidy types repeatedly. Instead, some service firms (i.e. transportation, real estate, and IT service firms) are less likely to have multiple, continuous business subsidies.

The descriptive analysis of previous studies (Pajarinen et al., 2008; Koski and Pajarinen, 2010) as well as our transition matrixes separating SMEs and large firms suggests that transition dynamics may be different for the small and large companies. We therefore aimed at doing separate estimations of the multinomial logit models for the SMEs and large companies, in

⁷ The estimation results concerning industry and regional dummies are available by request from the authors.

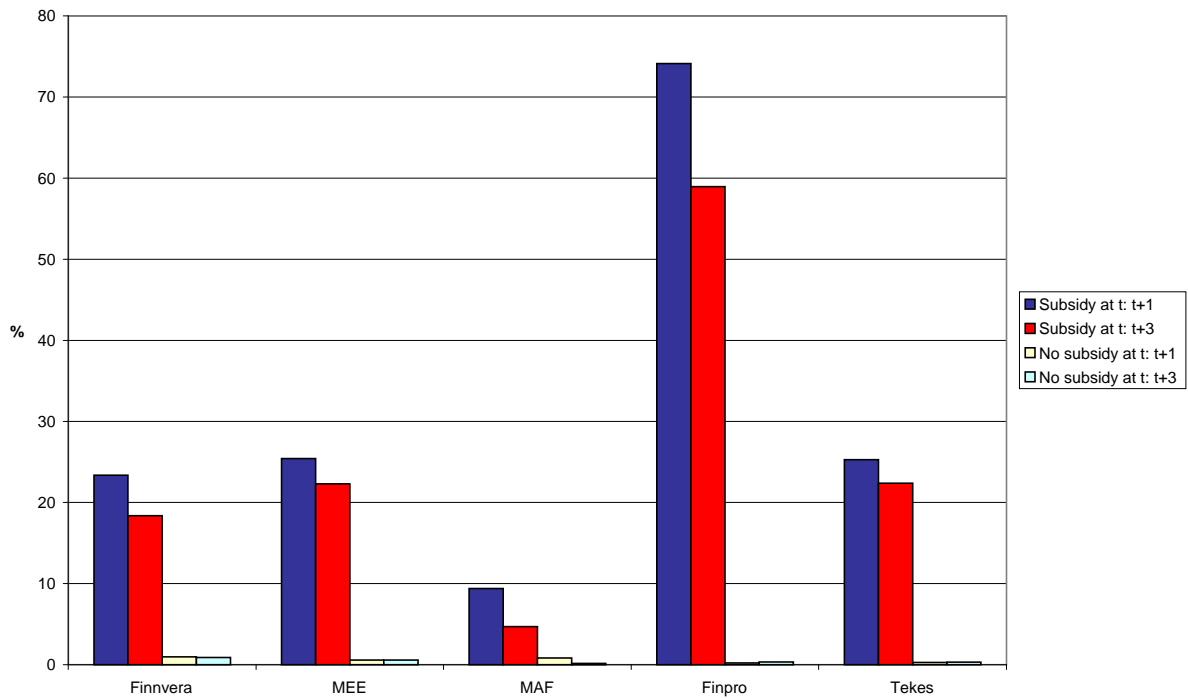
order to tell whether this dynamics applies similarly to both small and large firms. Our first remark concerning the estimations of the equations for the large firms is already quite revealing: we couldn't estimate the multinomial models for the transitions from/to the states of receiving subsidy only from Finnvera, Tekes or Ministry of Agriculture and Forestry due to the small number of observations. Also, for the same reason, as there were not sufficient number of transitions among large firms from Finpro subsidy only and multiple subsidy reception to the state of non-subsidization, we couldn't use the same reference group (i.e. base outcome) as in the estimated equations for the whole sample. Due to these reasons we did not proceed further in the additional regression analysis.

4. FURTHER DISCUSSION

Our empirical analysis focuses to the one-year-after transitions of the firms, while Figure 1 takes a further descriptive look on the persistency by looking at the subsidy reception of the firms not only at time $t+1$ but also three years later, $t+3$.

The non-subsidized firms at a given year tend not to be subsidized either in the future. Among those firms that had no subsidy granted, less than 1.5 percent received business subsidy both one and three years later. This finding applies to all agencies. Instead, close to one quarter of the firms that received subsidy from Finnvera, the Ministry of Employment and the Economy or Tekes at a given year, were granted subsidy again one year later. The percentages for the subsequent new subsidies three years later were not many percentage points smaller. Almost three quarters of Finpro's clients were still its customers one year later and almost 60 percent of them three years later. The persistency in support reception was clearly lowest among the firms that were subsidized by the Ministry of Agriculture and Forestry: less than 10 percent of the firms got a new subsidy one year later and less than 5 percent of them three years later. Interestingly, percentages for $t+3$ deviate surprisingly little from those observed one year after, hinting that the Finnish business subsidy system is characterized by long-term persistency.

Figure 1. Percentage of subsidized and non-subsidized firms (at year t) receiving support from the agencies one and three years later (years 2004–2008)

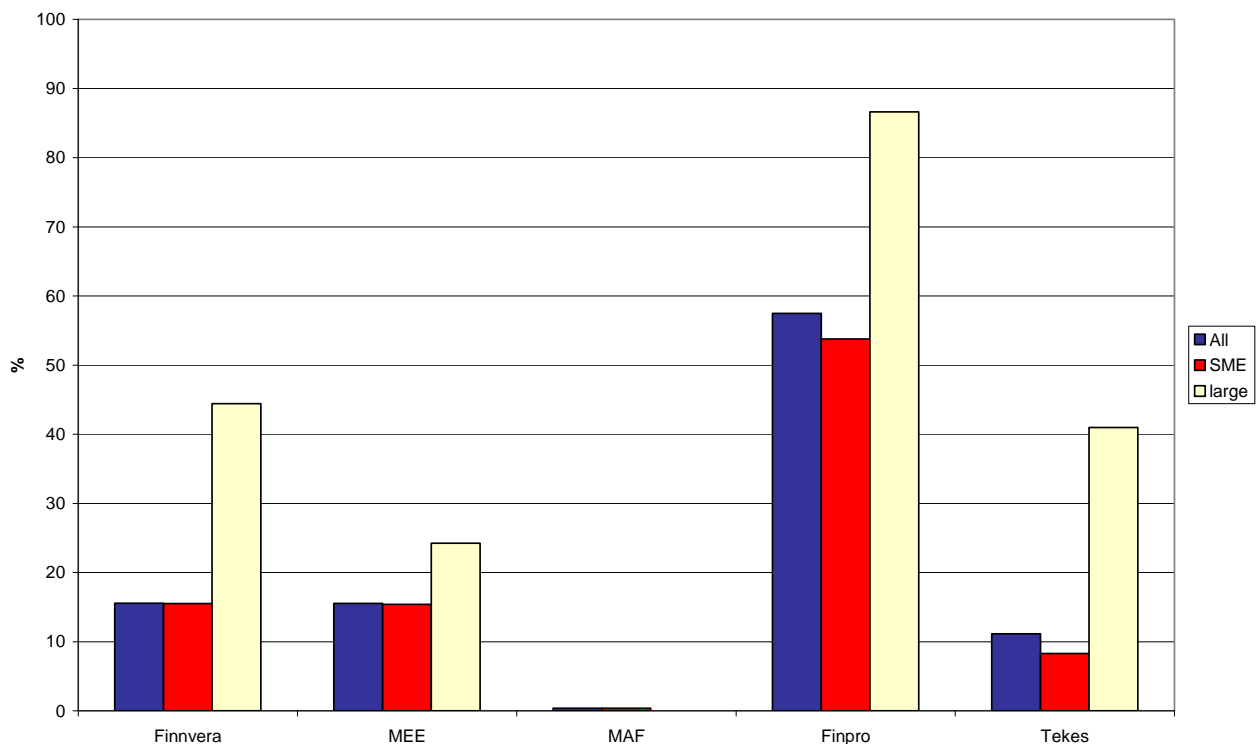


Further look on the data tell that path dependency between the states of subsidy reception across the agencies is strongest between Tekes and Finpro. Close to 30 percent of firms that received R&D subsidy from Tekes at a given year, were Finpro's clients one and three years after. Path dependency is stronger from Tekes funding to the following Finpro customership than vice versa as only 13 (11) percent of Finpro's client at a given year were granted a Tekes R&D subsidy during the following year (three years after). This descriptive finding hints that Finpro provides complementary service subsidies for R&D subsidies of Tekes. Possibly new products that a firm develops with the support of Tekes lead to the firm's expansion of markets or internationalization efforts for which the firm seeks for support from Finpro.

Figure 2 provides further evidence on the prolonged persistency of business subsidies in Finland. It illustrates the shares of firms subsidized in 2004 that received new subsidy from the same agency at least during four years, i.e. at least four out of five years, in 2004-2008. It seems that a relatively high share of firms, particularly the large ones, that were Finpro's customers in 2004 were likely to remain as its clients also during the following four years. Gen-

erally, larger firms seem to have a stronger continuity as the receivers of public support. Also, over 40 percent of large firms that were granted business subsidy by Tekes or Finnvera, received new subsidies during at least the three of the following four years. The Ministry of Agriculture and Forestry provides an exception here as well as almost none of the 2004 subsidized firms received further subsidies in three or four of the following four years.

Figure 2. Percentage of firms subsidized in 2004 that received new subsidy from the same agency at least during four years in 2004–2008



5. CONCLUSIONS

Our empirical analysis using an extensive database on the allocation of business subsidies in Finland during the years 2004–2008 finds that large firms are not only more likely to enter the public support system but they also tend to continue as the active users of business subsidies system. Less than 5 percent of large firms that obtained business subsidies from at least two different organizations at a given year exited the subsidy system and 67 percent of them continued having multiple subsidies during the following year. Corresponding per-

centages were less striking – 16 and 45 percentage, respectively – for the SMEs. Large firms are generally more likely to continue receiving both support from only one organization and simultaneous support from multiple organizations, and they also tend to transit between subsidies of different organizations more often than the smaller companies.

Our investigation finds another interesting characteristic of the Finnish business subsidy system: there seems to be persistency concerning *agency-specific loyal customers*. Transitions from receiving support only from one organization at a given year to having support only from the same organization during the following year were relatively common, whereas very rarely a firm that was a client of only one agency became the client of only another subsidy allocating agency. Firm size clearly relates positively to the probability of a firm becoming the agency-specific customer of any public support provider (i.e. a firm that tends to remain as the recipient of support from one organization only), while the effects of other firm-level factors on this probability vary among the agencies.

Particularly Finpro granting service subsidies and the Ministry of Employment and the Economy allocating various different types of subsidies seem to have a relatively persistent set of clients that do not use subsidies provided by the other organizations. The agency-specific customers of Finpro tend to be large, foreign-owned, and have a relatively high R&D intensity. The agency-specific clients of the Ministry of Employment and the Economy tend to be also large but they are more likely domestically-owned.

The most alarming observation that arises from the various parts of our analysis is that there is a group of firms – which comprises particularly large firms – that tends to obtain support from at least from two different organizations over several years. This finding is, as is also the existence of agency-specific loyal customers, contrary to the basic principles of business subsidy system originally designed for providing temporary aid for companies. Prolonged subsidies for certain firms may not only be waste of scarce public resources but they may also distort competition by supporting the existence of inefficient companies that would otherwise exit the market and be replaced by the more efficient firms. The effectiveness of the allocated business subsidies as well as the rationality of the current subsidy allocation principles need to be seriously evaluated.

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